WATER RESOURCES REVIEW for

JUNE
1976

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

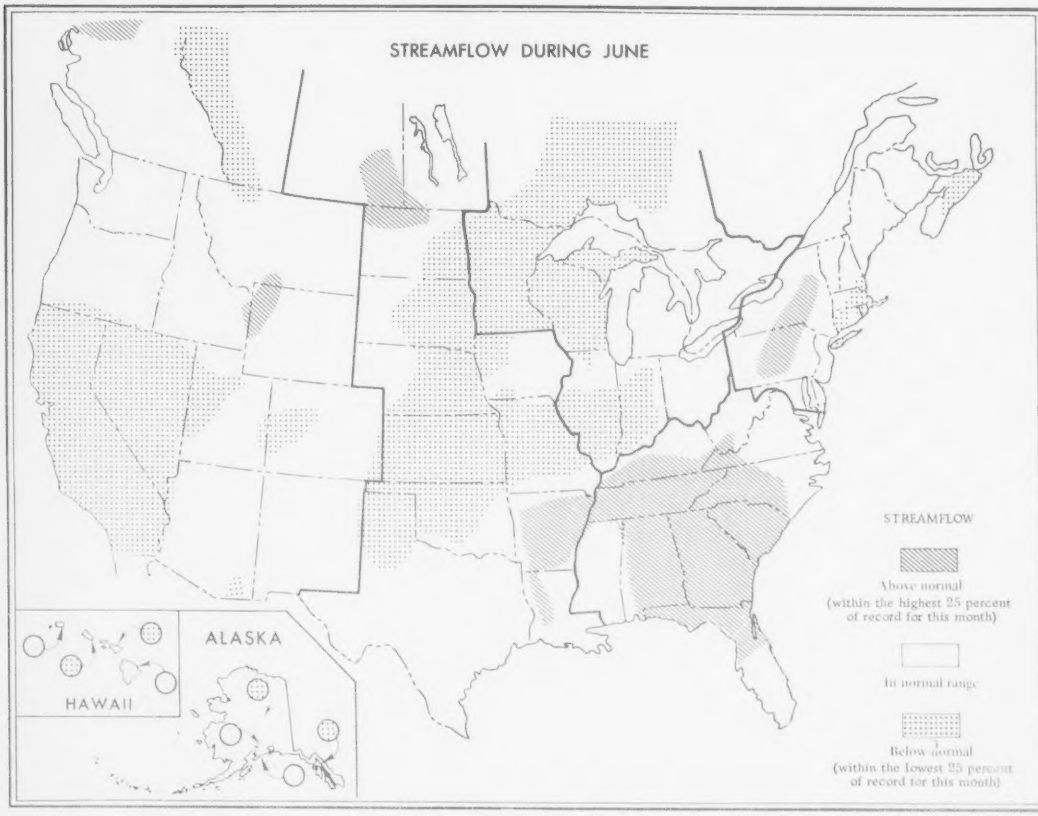
CANADA
DEPARTMENT OF THE ENVIRONMENT
WATER RESOURCES BRANCH

STREAMFLOW AND GROUND—WATER CONDITIONS

Streamflow generally increased in southwestern Canada and in many southeastern States. Flows also increased in Arkansas, Wyoming, and parts of Colorado, but generally decreased seasonally in the remainder of the United States and southern Canada.

Flows remained in the above-normal range in large areas of the Southeast and increased into that range in parts of New York, Pennsylvania, and Arkansas. Below-normal flows persisted in some north-central States and Provinces and in drought-stricken California. Monthly and daily mean flows were highest of record in parts of Georgia and lowest of record in central California.

Flooding occurred in New York, North Carolina, Arkansas, South Dakota, Texas, and Idaho.



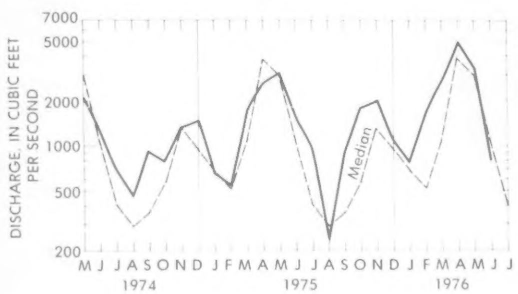
NORTHEAST

[Atlantic Provinces and Quebec; Delaware, Maryland, New York, New Jersey, Pennsylvania, and the New England States]

FLOWS DECREASED SEASONALLY IN NEARLY ALL STREAMS. HOWEVER, LOCALLY SEVERE FLOODING OCCURRED IN THE ELMIRA-CORNING AREA OF SOUTH-CENTRAL NEW YORK. MONTHLY FLOWS WERE IN THE ABOVE-NORMAL RANGE IN PARTS OF NEW YORK AND PENNSYLVANIA, AND BELOW NORMAL IN NORTHERN NOVA SCOTIA AND PARTS OF SOUTHERN NEW ENGLAND.

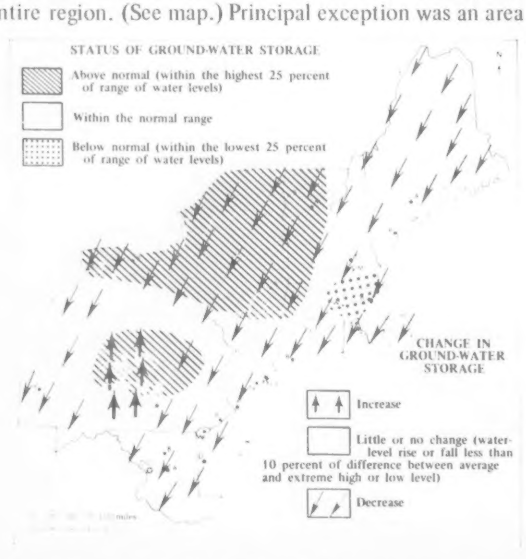
Locally heavy rains on June 19 and 20 caused flooding along tributaries of the Chemung River in the Elmira and Corning area of south-central New York, with estimated damages reported to be as high as one million dollars.

Typical of much of the regional trend was the flow of Pemigiwasset River at Plymouth in central New Hampshire––a decrease in flow from May but within the normal range for June. (See graph.)



Monthly mean discharge of Pemigewassett River at Plymouth, N.H. (Drainage area, 622 sq mi; 1,611 sq km)

Ground-water levels decreased seasonally in nearly the entire region. (See map.) Principal exception was an area



Map shows ground-water storage near end of June and change in ground-water stage from end of May to end of June.

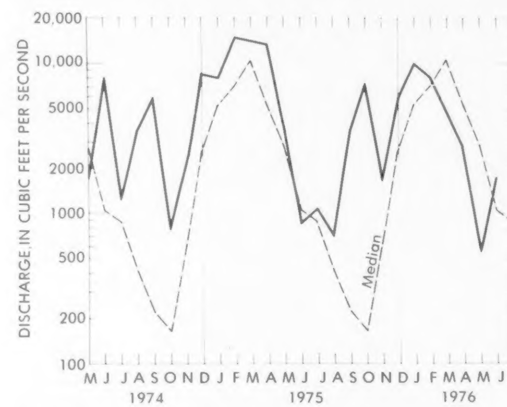
of rising levels in central Pennsylvania. Monthend levels were again above average in most of New York State, and were above average also in parts of east-central Pennsylvania. Levels were in the normal range for end of June in most of the remaining parts of the region except for below-average levels in central and northeastern Massachusetts.

SOUTHEAST

[Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia]

STREAMFLOW INCREASED IN MOST OF THE REGION, WHEREAS NORMAL SEASONAL DECREASES WERE LIMITED MAINLY TO SOME STREAMS IN ALABAMA, FLORIDA, AND MISSISSIPPI. FLOWS IN THE ABOVE-NORMAL RANGE WERE NEARLY REGIONWIDE IN EXTENT. LOCAL FLOODING OCCURRED ON SOME SMALL STREAMS IN WESTERN NORTH CAROLINA.

In response to above-average precipitation during the month, together with a carryover of above-median flows from May (except in Kentucky and West Virginia), streamflow in June increased and was in the above-normal range in most of the region. Flows decreased, however, in parts of Alabama, Florida, and Mississippi. Flows were in the normal range in most of Virginia, West Virginia, and Mississippi, as well as in southern Florida, eastern North Carolina, and northern Kentucky. (See graph of Licking River at Catawba, Ky.)



Monthly mean discharge of Licking River at Catawba, Ky. (Drainage area, 3,300 sq mi; 8,547 sq km)

In southeastern Georgia, the monthly and daily discharges of Alapaha River at Statenville––2,330 cfs and 6,440 cfs (on the 2d), respectively––were highest for June in 47 years of record (drainage area, 1,400 square miles); and the daily discharge of 38,000 cfs on June 1 of Altamaha River at Doctortown was highest for the month in 45 years of record. Other streams in the

Southeast with unusually high monthly flows for June included Ochlockonee River in northern Florida (5.6 times the June median), Hillsboro River in west-central Florida (4 times median), Conecuh River at Brantley, Ala. (4.2 times median), and Lynches River at Effingham, S. C. (3.6 times median).

In northern Florida, the discharge of Silver Springs was 660 cfs (87 percent of normal). In the southern part of the State, the discharge of Tamiami Canal outlets, 40-mile bend to Monroe, was 405 cfs (400 percent of normal), and the discharge of Miami Canal at Miami was 428 cfs (150 percent of normal).

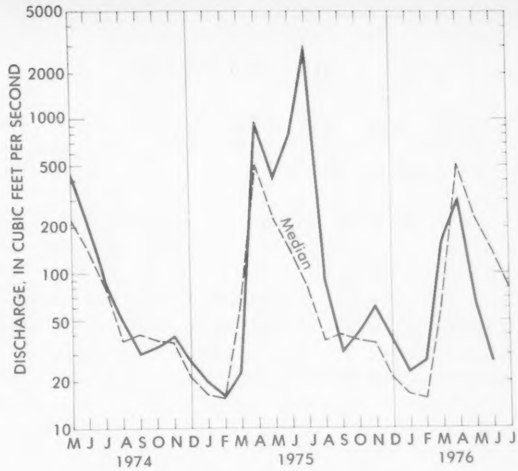
Ground-water levels generally declined in West Virginia (except in northwestern part), Kentucky, Mississippi, Alabama, western North Carolina, and in the Piedmont of Georgia. Levels were unchanged in eastern and central North Carolina; and rose in northern and southeastern Florida. In the heavily pumped areas of southeastern Georgia, levels were slightly lower in the Savannah area and relatively unchanged at Brunswick. Monthend levels were below average in West Virginia (except in southern and northwestern parts of State); were near average in central and eastern North Carolina (Piedmont and Coastal Plain); and were above average in western North Carolina (mountains) and in most of Kentucky. In Florida, monthend levels in the Floridan aquifer ranged from 6.2 feet below average at Jacksonville to 0.2 foot above average at Tallahassee. In the southeastern part of the State, monthend levels ranged from 0.4 foot below average to 1 foot above average. In the Jackson area of central Mississippi, a comparison of current levels in the Sparta Sand with those of a year ago showed an annual decline ranging from 1 to 3½ feet.

WESTERN GREAT LAKES REGION

[Ontario; Illinois, Indiana, Michigan, Minnesota, Ohio, and Wisconsin]

STREAMFLOW DECREASED SEASONALLY IN MOST OF THE STREAMS IN THE REGION BUT INCREASED IN INDIANA AND PARTS OF OHIO. FLOWS WERE BELOW THE NORMAL RANGE AT SOME OR ALL INDEX GAGING STATIONS IN EACH STATE AND PROVINCE IN THE REGION EXCEPT OHIO WHERE FLOWS WERE NORMAL.

Streamflow was below the normal range at two-thirds of the index stations in the region as a result of continued below-average precipitation during June. The general trend of sharp seasonal decline in monthly mean discharge, since the middle of the water year (about April), was typically represented at the index station on Buffalo River near Dilworth, in northwestern Minnesota. (See graph.)



Monthly mean discharge of Buffalo River near Dilworth, Minn. (Drainage area, 1,040 sq mi; 2,690 sq km)

Minnesota has been experiencing one of the driest springs of record—enough rain to relax fire danger warnings, but not enough to help crops or streams. All four index stations in Minnesota had monthly mean flows that were less than 20 percent of median and below the normal range.

In Illinois, locally severe thunderstorms occurred on June 13 in the southwestern suburbs of the Chicago area, producing excessive runoff in concentrated areas. Otherwise, streamflow declined generally throughout the State. The mean discharge during June at the index station on the Sangamon River near Monticello, in the central part of the State, was only 104 cfs (24 percent of median) and well below the normal range for the second consecutive month.

In Michigan, flows continued in the below-normal range in the Upper Peninsula for the 2d consecutive month; in the Lower Peninsula, however, they returned to normal.

Streamflow in Indiana increased at all three index stations but remained below the normal range for the 3d consecutive month in the southern part of the State.

Ground-water levels declined in the three northern States—Minnesota, Wisconsin, and Michigan. In Ohio, levels declined slightly in the northeastern part and rose in the central part of the State. Monthend levels were generally above average in Michigan; near average in Wisconsin and central Ohio; and below average in northeastern Ohio and in Minnesota. In the heavily pumped artesian aquifers of the Minneapolis-St. Paul, Minn., area, levels continued to decline and were below average in both the Prairie du Chien-Jordan aquifer and the deeper Mt. Simon-Hinckley aquifer.

MIDCONTINENT

[Manitoba and Saskatchewan; Arkansas, Iowa, Kansas, Louisiana, Missouri, Nebraska, North Dakota, Oklahoma, South Dakota, and Texas]

STREAMFLOW DECREASED IN NEARLY THE ENTIRE REGION. FLOWS WERE BELOW THE NORMAL RANGE IN PARTS OF NORTH AND SOUTH DAKOTA, EASTERN NEBRASKA, NORTHWESTERN IOWA, MISSOURI, KANSAS, AND OKLAHOMA. FLOWS INCREASED INTO THE ABOVE-NORMAL RANGE IN ARKANSAS AND WESTERN LOUISIANA. SEVERE LOCAL FLOODING OCCURRED IN HOUSTON, TEXAS, AND IN SOUTHWESTERN ARKANSAS AND WESTERN SOUTH DAKOTA.

Severe flooding occurred in the Black Hills of western South Dakota at midmonth as heavy rains of up to 10 inches fell in the area. Data on peak stages and discharges at selected gaging stations shown on the map (page 5) are given in the accompanying table. By contrast, in eastern South Dakota, drought conditions prevailed and flow at the index station on the Big Sioux River as measured at Akron, Iowa, was only 12 percent of median and in the below-normal range.

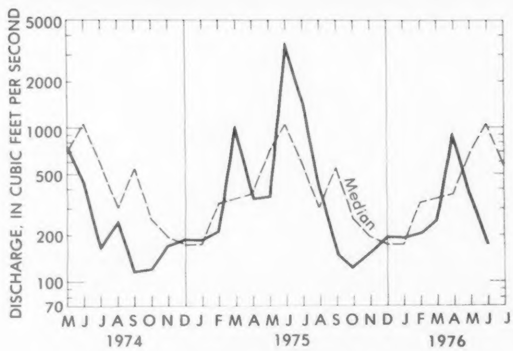
The generally dry conditions in southeastern North Dakota continued as the monthly mean discharge of Red River of the North at Grand Forks decreased seasonally and remained in the below-normal range for the second consecutive month.

In the central part of the region, monthly mean flow in Elkhorn River at Waterloo, Nebraska, decreased contraseasonally reflecting the very dry conditions over the entire State and was only 20 percent of median and in the below-normal range.

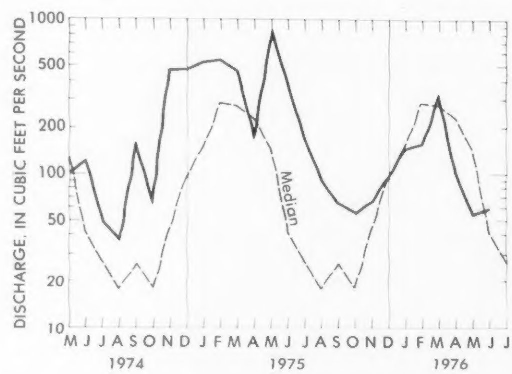
Streamflow in Oklahoma, Kansas, and Missouri decreased during the month and was below median and in the below-normal range at all reporting index stations. Typical of the below-normal conditions that prevailed in the region was the flow at Little Blue River near Barnes, Kansas, where flow was less than 20 percent of median. (See graph.)

In Arkansas, where streamflow during May was in the below-normal range, monthly mean discharge at both index stations increased sharply to over three times median and was in the above-normal range. A local storm on June 18 caused severe flooding in the Texarkana area in extreme southeastern Arkansas.

In northern Louisiana, flow of Saline Bayou near Lucky increased contraseasonally from the below-normal range to the normal range. (See graph.)



Monthly mean discharge of Little Blue River near Barnes, Kansas (Drainage area, 3,324 sq mi; 8,609 sq km)



Monthly mean discharge of Saline Bayou near Lucky, La. (Drainage area, 154 sq mi; 399 sq km)

In Texas, monthly mean discharge at all index stations decreased seasonally and was in the normal range. A small part of Harris County received up to 13 inches of rain on June 15 and caused flooding in the Houston area. Peak discharge at the gaging station, Brays Bayou at Houston (drainage area, 88.4 square miles) was highest in 40 years of record; discharge on June 15 was 29,000 cfs. Peak discharge on June 16 of Sims Bayou at Houston (drainage area, 64.0 square miles) was 11,100 cfs and equivalent to that of a 25-year flood.

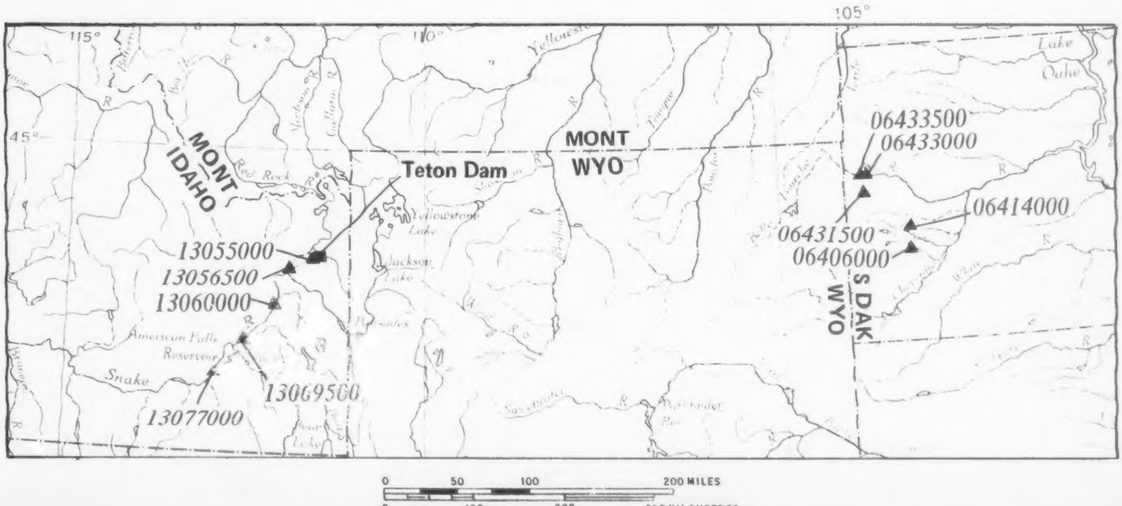
Ground-water levels rose in northern and western parts of North Dakota, and generally declined in southeastern North Dakota and in Iowa, Nebraska (except in northwestern part), Kansas, and east-central Arkansas. Monthend levels were near or above average in Iowa (except in northeastern part of State), near average in northern and western North Dakota, slightly below average in Kansas, and below average in most of Nebraska and southeastern North Dakota. In the industrial aquifer of central and southern Arkansas (Sparta Sand), the level rose and was below average at

Provisional data; subject to revision

STAGES AND DISCHARGES FOR THE FLOODS OF JUNE 1976 AT SELECTED SITES IN SOUTH DAKOTA AND IDAHO

WRD station number	Stream and place of determination	Drainage area (square miles)	Period of known floods	Maximum flood previously known			Maximum during present flood				
				Date	Stage (feet)	Discharge (cfs)	Date	Stage (feet)	Discharge		Recurrence interval (years)
									Cfs	Cfs per square mile	
				SOUTH DAKOTA							
CHEYENNE RIVER BASIN											
06406000	Battle Creek at Hermosa.	178	1903, 1949–	June 10, 1972	17.72	21,400	June 15	12.40	1,450	8.1	8
06414000	Rapid Creek at Rapid City.	410	1903–06, 1942–	June 9, 1972	19.66	50,000	14	6.88	1,370	3.3	40
06431500	Spearfish Creek at Spearfish.	168	1946–	May 15, 1965	10.53	4,240	15	10.54	4,260	25.4	45
06433000	Red Water River above Belle Fourche.	920	1945–	June 16, 1962	11.69	16,400	15	8.78	6,550	7.1	20
06433500	Hay Creek at Belle Fourche.	121	1953–	June 19, 1972	9.15	930	15	8.24	630	5.2	30
				IDAHO							
HENRYS FORK BASIN											
13055000	Teton River near St. Anthony	890	1890–93, 1903–09, 1920–	Feb. 12, 1962	9.36	11,000	June 5	.....	a	......	.....
13056500	Henrys Fork near Rexburg.	2,920	1909–	May 29, 1970	10.30	11,200	5	22.5	b	......	.....
SNAKE RIVER BASIN											
13060000	Snake River near Shelley.	9,790	1915–	June 17, 1918	16.97	47,200[c]	June 6	19.04	69,300	7.1	.....
13069500	Snake River near Blackfoot.	11,310	1910–	June 18, 1918	14.80	46,200	7	15.38	52,800	4.7	.....
13077000	Snake River at Nelley ...	13,600	1906–	June 20, 1918	13.5	48,400	9,10	8.35	21,800	1.6	.....

[a]Stage and discharge not yet determined.
[b]Discharge not determined.
[c]Maximum discharge known, 75,000 cfs on June 6, 1894, at former station at Idaho Falls.



Pine Bluff, and the level fell and was above average at El Dorado. In Louisiana, levels declined in major aquifers supplying ground water to Baton Rouge, New Orleans, and Lake Charles, and declined also in the Sparta Sand in the northern part of the State and in the Chicot aquifer in the southwestern part. Levels rose in the terrace and Miocene aquifers of central Louisiana. In Texas, levels rose in the Edwards Limestone at Austin and in the Evangeline aquifer at Houston; and declined in the Edwards Limestone at San Antonio and in the bolson deposits at El Paso. Monthend levels were above average at Austin and San Antonio, and below average at Houston (alltime June low) and El Paso (alltime low).

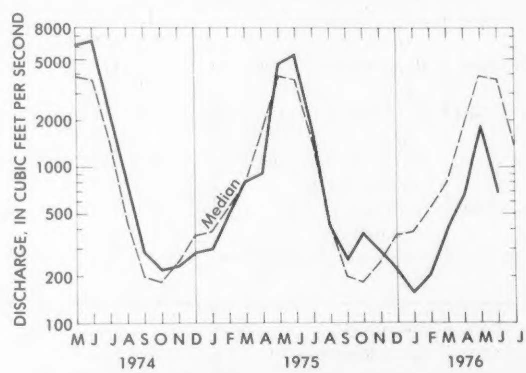
WEST

[Alberta and British Columbia; Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming]

STREAMFLOW DECREASED SEASONALLY IN MOST OF THE REGION BUT INCREASED IN PARTS OF ALBERTA, BRITISH COLUMBIA, WYOMING, AND COLORADO. FLOWS REMAINED IN THE ABOVE-NORMAL RANGE IN PARTS OF MONTANA, WYOMING, IDAHO, AND BRITISH COLUMBIA. DROUGHT CONDITIONS PERSISTED IN CALIFORNIA WHERE SOME MONTHLY AND DAILY MEAN FLOWS WERE LOWEST OF RECORD FOR JUNE. SEVERE FLOODING OCCURRED IN SOUTHEASTERN IDAHO WHEN TETON DAM COLLAPSED.

Major flooding struck suddenly on June 5 in southeastern Idaho along Teton River, Henrys Fork, and part of the Upper Snake River downstream from Henrys Fork when Teton Dam on Teton River near Newdale collapsed at 11:57 a.m. The reservoir (behind the 305-foot high earth-fill dam) contained 251,000 acre-feet of water at that time. In the next 143 minutes, approximately 173,000 acre-feet of water drained through the breach. Both gages downstream from the dam on the Teton River were destroyed (stations 13054805 and 13055000), and the gage on Henrys Fork near Rexburg (station 13056500) was overtopped by several feet. American Falls Reservoir at American Falls, with a million acre-feet capacity, easily contained the entire flood wave. Selected data on stages, discharges, and gaging-station locations are given in the accompanying table and map.

In contrast, streamflow in drought-stricken California was far below normal. In the south-central part of the State, the monthly mean discharge of 687 cfs, and daily mean discharge of 340 cfs on June 30, in Kings River above North Fork, near Trimmer, were lowest for the month in 45 years of record. (See graph.) Contents of major reservoirs in northern California decreased to 72 percent of average and 64 percent of last year. Many brush and forest fires were reported due to the very dry and hot weather with more than 30,000 acres burned over to date (June 25). Some communities have imposed restrictions on water for residential use; irrigation water was expected to be depleted in some areas by July 15.



Monthly mean discharge of Kings River above North Fork, near Trimmer, Calif. (Drainage area, 952 sq mi; 2,466 sq km)

Monthly mean flows in Nevada and Utah were generally in the below-normal range. In north-central Utah, the level of Great Salt Lake reached its seasonal peak on June 1 (4,202.25 feet above mean sea level) and had fallen 0.4 foot at monthend. The maximum water-surface elevation at Great Salt Lake since 1851 was 4,211.6 feet above sea level in 1873; the minimum was 4,191.6 feet in 1961.

Storage in major reservoirs was generally below average in California and Washington and near average in Idaho. The net increase in storage in the Colorado River Storage Project was 924,710 acre-feet during the month.

Ground-water levels rose in Montana, northern Idaho, and northeastern and southeastern Utah; and generally declined in eastern Washington, in Nevada, central and western Utah, and southern Arizona and New Mexico. In southern New Mexico, levels declined 3.5 feet in the key well in the Pecos Valley and 1.4 feet in the key well in the Mimbres Valley. Monthend levels were above average in Montana, northern Idaho, northern and eastern Nevada (Paradise and Steptoe), and in northeastern and southeastern Utah (Logan and Blanding); and were below average in most of Utah and in southern California and in southern New Mexico. In southern Arizona, the level in the key well in Avra Valley was lowest of record for June and in well Tucson No. 2 was at an alltime low. In southern Idaho in wells representative of the Snake Plain aquifer, levels rose at Atomic

(Continued on page 11.)

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF JUNE 1976

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

Reservoir Principal uses: F–Flood control I–Irrigation M–Municipal P–Power R–Recreation W–Industrial	End of May 1976	End of June 1976	End of June 1975	Average for end of June	Normal maximum
	Percent of normal maximum				
NORTHEAST REGION					
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs (P)	92	78	67	71	223,400 (a)
QUEBEC					
Allard (P)	94	83	93	129	280,600 ac-ft
Gouin (P)	78	82	79	100	6,954,000 ac-ft
MAINE					
Seven reservoir systems (MP)	100	94	92	86	178,500 mcf
NEW HAMPSHIRE					
First Connecticut Lake (P)	92	91	90	90	3,330 mcf
Lake Francis (FPR)	96	65	73	87	4,326 mcf
Lake Winnipesaukee (PR)	107	102	99	96	7,200 mcf
VERMONT					
Harriman (P)	84	78	85	83	5,060 mcf
Somerset (P)	93	61	98	87	2,500 mcf
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	90	79	87	88	3,394 mcf
NEW YORK					
Great Sacandaga Lake (FPR)	100	95	95	92	34,270 mcf
Indian Lake (FMP)	106	106	109	101	4,500 mcf
New York City reservoir system (MW)	100	96	100	......	547,500 mg
NEW JERSEY					
Wanaque (M)	100	93	99	89	27,730 mg
PENNSYLVANIA					
Allegheny (FPR)	51	49	49	49	51,400 mcf
Pymatuning (FMR)	95	93	100	97	8,191 mcf
Raystown Lake (FR)	67	68	68	47	33,190 mcf
Lake Wallenpaupack (PR)	85	86	83	80	6,875 mcf
MARYLAND					
Baltimore municipal system (M)	99	100	100	93	85,340 mg
SOUTHEAST REGION					
NORTH CAROLINA					
Bridgewater (Lake James) (P)	100	96	96	90	12,580 mcf
Narrows (Badin Lake) (P)	93	97	97	98	5,617 mcf
High Rock Lake (P)	87	96	93	77	10,230 mcf
SOUTH CAROLINA					
Lake Murray (P)	94	95	92	78	70,300 mcf
Lakes Marion and Moultrie (P)	89	94	93	73	81,100 mcf
SOUTH CAROLINA--GEORGIA					
Clark Hill (FP)	79	83	77	73	75,360 mcf
GEORGIA					
Burton (PR)	98	99	94	90	104,000 ac-ft
Sinclair (MPR)	88	93	96	92	214,000 ac-ft
Lake Sidney Lanier (FMPR)	66	66	65	63	1,686,000 ac-ft
ALABAMA					
Lake Martin (P)	99	105	100	91	1,373,000 ac-ft
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	59	60	67	62	1,156,000 cfsd
Douglas Lake (FPR)	66	87	68	66	703,100 cfsd
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	92	95	78	80	510,300 cfsd
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	64	68	77	67	1,452,000 cfsd
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	91	95	77	83	745,200 cfsd
WESTERN GREAT LAKES REGION					
WISCONSIN					
Chippewa and Flambeau (PR)	94	91	97	87	15,900 mcf
Wisconsin River (21 reservoirs) (PR)	90	70	87	82	17,400 mcf
MINNESOTA					
Mississippi River headwater system (FMR)	24	27	45	41	1,640,000 ac-ft
MIDCONTINENT REGION					
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	89	95	101	......	22,640,000 ac-ft
SOUTH DAKOTA					
Angostura (I)	74	82	89	92	127,600 ac-ft
Bell Fourche (I)	73	79	93	71	185,200 ac-ft
Lake Francis Case (FIP)	77	74	90	85	4,834,000 ac-ft
Lake Oahe (FIP)	85	87	96	......	22,530,000 ac-ft
MIDCONTINENT REGION—Continued					
SOUTH DAKOTA--Continued					
Lake Sharpe (FIP)	102	102	101	99	1,725,000 ac-ft
Lewis and Clarke Lake (FIP)	83	87	81	88	477,000 ac-ft
NEBRASKA					
Lake McConaughy (IP)	86	80	87	80	1,948,000 ac-ft
OKLAHOMA					
Eufaula (FPR)	99	94	106	92	2,378,000 ac-ft
Keystone (FPR)	97	86	110	104	661,000 ac-ft
Tenkiller Ferry (FPR)	103	102	107	100	628,200 ac-ft
Lake Altus (FIMR)	99	99	92	66	134,500 ac-ft
Lake O'The Cherokees (FPR)	96	103	103	95	1,492,000 ac-ft
OKLAHOMA--TEXAS					
Lake Texoma (FMPRW)	100	101	104	101	2,722,000 ac-ft
TEXAS					
Bridgeport (IMW)	88	90	100	49	386,400 ac-ft
Canyon (FMR)	99	95	100	70	385,600 ac-ft
International Amistad (FIMPW)	99	99	100	68	3,497,000 ac-ft
International Falcon (FIMPW)	92	87	92	61	2,667,000 ac-ft
Livingston (IMW)	100	100	100	75	1,788,000 ac-ft
Possum Kingdom (IMPRW)	93	91	95	107	569,400 ac-ft
Red Bluff (PI)	29	27	47	27	307,000 ac-ft
Toledo Bend (P)	100	100	100	86	4,472,000 ac-ft
Twin Buttes (FIM)	99	94	98	9	177,800 ac-ft
Lake Kemp (IMW)	80	77	68	96	268,000 ac-ft
Lake Meredith (FMW)	40	39	46	38	821,300 ac-ft
Lake Travis (FIMPRW)	98	96	100	80	1,144,000 ac-ft
THE WEST					
WASHINGTON					
Ross (PR)	59	89	80	90	1,052,000 ac-ft
Franklin D. Roosevelt Lake (IP)	57	93	90	96	5,232,000 ac-ft
Lake Chelan (PR)	71	95	90	97	676,100 ac-ft
Lake Cushman	92	99	97	99	359,500 ac-ft
Lake Merwin (P)	103	104	105	105	246,000 ac-ft
IDAHO					
Boise River (4 reservoirs) (FIP)	86	91	83	93	1,235,000 ac-ft
Coeur d'Alene Lake (P)	165	100	85	83	238,500 ac-ft
Pend Oreille Lake (FP)	93	98	101	98	1,561,000 ac-ft
IDAHO--WYOMING					
Upper Snake River (8 reservoirs) (MP)	65	77	77	81	4,401,000 ac-ft
WYOMING					
Boysen (FIP)	51	75	79	90	802,000 ac-ft
Buffalo Bill (IP)	52	80	66	103	421,300 ac-ft
Keyhole (F)	70	76	79	46	199,900 ac-ft
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	74	79	80	62	3,056,000 ac-ft
COLORADO					
John Martin (FIR)	0	0	0	20	364,400 ac-ft
Taylor Park (IR)	63	85	86	97	106,200 ac-ft
Colorado-Big Thompson project (I)	73	79	87	77	722,600 ac-ft
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Navajo, and Blue Mesa Reservoirs (IFPR)	81	84	82	......	31,280,000 ac-ft
UTAH--IDAHO					
Bear Lake (IPR)	90	92	93	69	1,421,000 ac-ft
CALIFORNIA					
Folsom (FIP)	64	59	95	93	1,000,000 ac-ft
Hetch Hetchy (MP)	57	57	89	82	360,400 ac-ft
Isabella (FIR)	31	26	62	46	551,800 ac-ft
Pine Flat (FI)	57	47	83	70	1,014,000 ac-ft
Clair Engle Lake (Lewiston) (P)	86	83	99	94	2,438,000 ac-ft
Lake Almanor (P)	58	59	100	63	1,036,000 ac-ft
Lake Berryessa (FIMW)	77	74	96	87	1,600,000 ac-ft
Millerton Lake (FI)	73	69	93	83	503,200 ac-ft
Shasta Lake (FIPR)	61	51	101	90	4,377,000 ac-ft
CALIFORNIA--NEVADA					
Lake Tahoe (IPR)	....	60	91	75	744,600 ac-ft
NEVADA					
Rye Patch (I)	87	84	103	......	157,200 ac-ft
ARIZONA--NEVADA					
Lake Mead and Lake Mohave (FIMP)	79	78	75	72	27,970,000 ac-ft
ARIZONA					
San Carlos (IP)	6	4	15	14	1,093,000 ac-ft
Salt and Verde River system (IMPR)	66	61	66	43	2,073,000 ac-ft
NEW MEXICO					
Conchas (FIR)	23	23	31	78	352,600 ac-ft
Elephant Butte and Caballo (FIPR)	24	20	22	29	2,539,000 ac-ft

[a]Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage)

DISSOLVED SOLIDS AND WATER TEMPERATURES FOR JUNE AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	June data of following calendar years	Stream discharge during month	Dissolved-solids concentration during month[a]		Dissolved-solids discharge during month[a]			Water temperature during month		
			Mean (cfs)	Minimum (mg/l)	Maximum (mg/l)	Mean (tons per day)	Minimum (tons per day)	Maximum (tons per day)	Mean, in °C	Mini-mum, in °C	Maxi-mum, in °C
	NORTHEAST										
01463500	Delaware River at Trenton, N.J. (Morrisville, Pa.)	1976	7,440	89	127	2,040	1,190	3,780	23.5 (74°F)	19.5 (67°F)	26.5 (80°F)
		1945–75	9,700 [6,992[b]]	60 (June 1–10,1945)	143 (June 27, 1965)	......	495 (June 29, 1965)	22,100 (June 30, 1973)	......	13.5 (56°F)	34.0 (93°F)
04264331	St. Lawrence River at Cornwall, Ontario, near Massena, N.Y. (streamflow station formerly at Ogdensburg, N.Y.)	1976	348,000	166	169	157,000	153,000	159,000	15.0 (59°F)	11.5 (52°F)	17.5 (64°F)
		1966–75	276,400 [261,500[b]]	....	....	......	....	....	15.5 (60°F)	11.0 (52°F)	20.0 (68°F)
	SOUTHEAST										
07289000	Mississippi River at Vicksburg, Miss	1976	438,600 [591,400[b]]	272	316	338,000	265,000	429,000	19.0 (66°F)	17.0 (62°F)	21.0 (70°F)
	WESTERN GREAT LAKES REGION										
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (25 miles west of Paducah, Ky.; streamflow station at Metropolis, Ill.)	1976	188,500	148	180	......	43,900	132,000	......	21.0 (70°F)	25.5 (78°F)
		1955–75,	206,100 [174,600[b]]	111 (June 16, 1974)	300 (June 30, 1970)	......	27,400 (June 30, 1965)	328,000 (June 1, 1968)	......	16.5 (62°F)	30.0 (86°F)
	MIDCONTINENT										
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1976	69,800 [109,600[b]]	283	360	60,100	48,500	86,500	24.0 (75°F)	21.0 (70°F)	25.5 (78°F)
	WEST										
14128910	Columbia River at Warrendale, Oreg. (30 miles east of Portland, Oreg.; streamflow station at The Dalles, Oreg.)	1976	284,400	61	67	49,300	40,400	57,900	14.5 (58°F)	12.5 (54°F)	16.0 (61°F)
		1968–73	373,800 [454,200[b]]	....	....	......	....	....	......	12.0 (54°F)	18.0 (64°F)

[a]Dissolved-solids concentrations when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]Median of monthly values for 30-year reference period, water years 1941–70, for comparison with data for current month.

ANNUAL REPORTS ON QUALITY OF SURFACE WATERS IN THE UNITED STATES, 1941–70

For more than 60 years the U.S. Geological Survey has made quality-of-water investigations of the chemical and physical characteristics of the surface- and ground-water resources of the Nation. Many of the investigations carried on in cooperation with State and Federal agencies deal with the amounts of matter in solution and in suspension in streams. The results of practically all Survey investigations, including detailed chemical analyses, are assembled into reports that are published by the Geological Survey or by the cooperating agencies.

Since 1941, the Survey has published annual records of chemical quality, suspended sediment, and water temperature. These annual reports, in from 1 to 10 volumes each year, are a part of the Survey's series of water-supply papers. The reports are available for reference at many of the larger public and university libraries as well as at offices of the Geological Survey and cooperating agencies. The data are arranged by river basins, using the same regional and location numbering system as is used in the Survey's annual series of reports on stream discharge and contents of lakes and reservoirs. The boundaries of the regional areas, known as "parts," are shown on the accompanying map.

The annual Federal reports on water quality have been published for data collected through the end of September 1970. The report numbers of the published reports are listed in the accompanying table. In addition to the annual series of water-supply papers containing data by regions, the Geological Survey has published annual data since 1964 by States in a series of limited-edition, basic-data reports intended primarily to meet the needs of cooperating local, State, and Federal officials for reasonably current information. Beginning with water year 1971, these State annual basic-data reports constitute the primary form of publication of basic-data on quality of surface water. The annual Federal reports will no longer be published in the water-supply paper series.

Since 1966, the investigations and analyses of water quality by the Survey, have been considerably broadened in scope and intensity. The development of new instruments for sensing and recording of a number of water-quality parameters at the stream site have made it possible to continuously record specific conductance, pH, dissolved oxygen, temperature, and turbidity. Also, in addition to the chemical and physical data of previous years, the investigations include analyses for biological, microbiological, radiochemical, and organic parameters, where detailed information is required.

Map showing areas covered by the parts of the periodic reports on surface water supply of the United States. (For 1951–70, parts 1, 2, 3, and 6 were subdivided into parts 1A and 1B, 2A and 2B, 3A and 3B, and 6A and 6B, respectively, in the annual reports on surface water.)

Year, parts (regions), and report numbers of annual reports on quality of surface water of the United States, 1941–70

Water year (Oct.–Sept.) ending Sept. 30	Water-Supply Paper number												
	Part 1	Part 2	Part 3	Part 4	Part 5	Part 6	Part 7	Part 8	Parts 9–10	Part 11	Parts 12–14 and 16[a]	Alaska (part 15)	Irrigation stations (parts 5–14)[b]
1941	942	942	942	942	942	942	942	942	942	942	942	....	....
1942	950	950	950	950	950	950	950	950	950	950	950	....	....
1943	970	970	970	970	970	970	970	970	970	970	970	....	....
1944	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	1022	....	....
1945	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	....	....
1946	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050	....	....
1947	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	1102	....	....
1948	1132	1132	1132	1132	1132	1132	1133	1133	1133	1133	1133	1372	....
1949	1162	1162	1162	1162	1162	1162	1163	1163	1163	1163	1163	1372	....
1950	1186	1186	1186	1186	1187	1187	1188	1188	1189	1189	1189	1372	....
1951	1197	1197	1197	1197	1198	1198	1199	1199	1200	1200	1200	1466	1264
1952	1250	1250	1250	1250	1251	1251	1252	1252	1253	1253	1253	1466	1362
1953	1290	1290	1290	1290	1291	1291	1292	1292	1293	1293	1293	1466	1380
1954	1350	1350	1350	1350	1351	1351	1352	1352	1353	1353	1353	1486	1430
1955	1400	1400	1400	1400	1401	1401	1402	1402	1403	1403	1403	1486	1465
1956	1450	1450	1450	1450	1451	1451	1452	1452	1453	1453	1453	1486	1485
1957	1520	1520	1520	1520	1521	1521	1522	1522	1523	1523	1523	1500	1524
1958	1571	1571	1571	1571	1572	1572	1573	1573	1574	1574	1574	1570	1575
1959	1641	1641	1642	1642	1643	1643	1644	1644	1645	1645	1645	1640	1699
1960	1741	1741	1742	1742	1743	1743	1744	1744	1745	1745	1745	1720	1746
1961	1881	1881	1882	1882	1883	1883	1884	1884	1885	1885	1885	1953	1886
1962	1941	1941	1942	1942	1943	1943	1944	1944	1945	1945	1945	1953	1946
1963	1947	1947	1948	1948	1949	1949	1950	1950	1951	1951	1951	1953	1952
1964	1954	1954	1955	1955	1956	1956	1957	1957	1958	1958	1959	1959	1960
1965	1961	1961	1962	1962	1963	1963	1964	1964	1965	1965	1966	1966	1967
1966	1991	1991	1992	1992	1993	1993	1994	1994	1995	1995	1966	1966	(b)
1967	2011	2011	2012	2012	2013	2013	2014	2014	2015	2015	2016	2016	....
1968	2091	2092	2093	2094	2094	9095	2096	2097	2098	2099	2100	2100	....
1969	2141	2142	2143	2144	2144	2145	2146	2147	2148	2149	2150	2150	....
1970	2151	2152	2153	2154	2154	2155	2156	2157	2158	2159	2160	2160	....

[a]Includes data for part 16 (Hawaii and other Pacific areas), beginning in 1965, but actual, part-16 analytical data contained in reports for 1965 and 1966 are for Okinawa only.

[b]Series concluded in 1965; subsequent data (in mg/l rather than epm) incorporated in appropriate parts of regular series, such as in Water-Supply Papers 1993–1996 for water year 1966.

FLOW OF LARGE RIVERS DURING JUNE 1976

Station number*	Stream and place of determination	Drainage area (square miles)	Mean annual discharge through September 1970 (cfs)	June 1976					
				Monthly discharge (cfs)	Percent of median monthly discharge, 1941–70	Change in discharge from previous month (percent)	Discharge near end of month		
							(cfs)	(mgd)	Date
1–0140	St. John River below Fish River at Fort Kent, Maine.	5,690	9,397	7,667	82	-80	7,800	5,040	30
1–3185	Hudson River at Hadley, N.Y	1,664	2,791	3,495	151	-52	4,000	2,590	30
1–3575	Mohawk River at Cohoes, N.Y	3,456	5,450	5,800	189	-46	....	....	.....
1–4635	Delaware River at Trenton, N.J	6,780	11,360	7,530	108	-46	8,970	5,800	27
1–5705	Susquehanna River at Harrisburg, Pa.	24,100	33,670	35,240	153	+14	28,800	18,600	30
1–6465	Potomac River near Washington, D.C.	11,560	[1]10,640	6,780	91	+25	5,000	3,200	30
2–1055	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	4,847	5,430	280	+100	3,850	2,490	30
2–1310	Pee Dee River at Peedee, S.C	8,830	9,098	12,300	209	+95	20,000	12,900	28
2–2260	Altamaha River at Doctortown, Ga.	13,600	13,380	20,270	236	+11	11,300	7,300	25
2–3205	Suwannee River at Branford, Fla	7,740	6,775	13,300	268	+129	10,500	6,790	29
2–3580	Apalachicola River at Chattahoochee, Fla.	17,200	21,690	29,300	178	-24	21,400	13,800	29
2–4670	Tombigbee River at Demopolis lock and dam near Coatopa, Ala.	15,400	21,700	12,115	189	-71	8,600	5,560	28
2–4895	Pearl River near Bogalusa, La	6,630	8,533	5,063	142	-38	3,920	2,530	30
3–0495	Allegheny River at Natrona, Pa	11,410	[1]18,700	8,610	75	-9	9,900	6,400	29
3–0850	Monongahela River at Braddock, Pa.	7,337	[1]11,950	4,448	71	-22	4,150	2,680	29
3–1930	Kanawha River at Kanawha Falls, W.Va.	8,367	12,370	11,900	177	+95	12,000	7,760	28
3–2345	Scioto River at Higby, Ohio	5,131	4,337	2,488	122	+215	4,800	3,100	28
3–2945	Ohio River at Louisville, Ky[2]	91,170	110,600	57,800	94	+36	99,400	64,200	27
3–3775	Wabash River at Mount Carmel, Ill.	28,600	26,310	12,540	59	-21	18,200	11,800	30
3–4690	French Broad River below Douglas Dam, Tenn.	4,543	[1]6,528	8,162	175	+19	....	....	.....
4–0845	Fox River at Rapide Croche Dam, near Wrightstown, Wis.[2]	6,150	4,142	2,800	74	-59	....	....	.....
02MC002 (4–2643.31)	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y.[3]	299,000	239,100	348,400	133	+6	350,000	226,000	30
050115	St. Maurice River at Grand Mere, Quebec.	16,300	24,900	22,500	75	-75	14,600	9,400	25
5–0825	Red River of the North at Grand Forks, N. Dak.	30,100	2,439	1,540	34	-40	1,400	900	30
5–3300	Minnesota River near Jordan, Minn ..	16,200	3,306	717	13	-47	890	580	25
5–3310	Mississippi River at St. Paul, Minn ...	36,800	[1]10,230	2,882	16	-56	2,470	1,600	24
5–3655	Chippewa River at Chippewa Falls, Wis.	5,600	5,062	1,171	21	-72	....	....	.....
5–4070	Wisconsin River at Muscoda, Wis	10,300	8,457	6,207	63	-52	....	....	.....
5–4465	Rock River near Joslin, Ill	9,520	5,288	4,613	84	-51	3,300	2,130	30
5–4745	Mississippi River at Keokuk, Iowa ...	119,000	61,210	42,400	49	-53	38,000	24,600	30
5–4855	Des Moines River below Raccoon River at Des Moines, Iowa.	9,879	3,796	4,826	67	-27	4,230	2,730	29
6–2145	Yellowstone River at Billings, Mont.	11,795	6,754	31,190	118	+29	25,000	16,200	30
6–9345	Missouri River at Hermann, Mo	528,200	78,480	69,910	64	-31	59,200	38,300	28
7–2890	Mississippi River at Vicksburg, Miss.[4]	1,144,500	552,700	438,600	74	-21	463,000	299,000	30
7–3310	Washita River near Durwood, Okla ..	7,202	1,379	758	45	-41	320	210	30
8–3130	Rio Grande at Otowi Bridge, near San Ildefonso, N.Mex.	14,300	1,530	1,452	85	-54	....	....	.....
9–3150	Green River at Green River, Utah ...	40,600	6,369	13,130	71	-6	8,300	5,360	30
11–4255	Sacramento River at Verona, Calif ...	21,257	18,370	10,800	102	+7	9,500	6,140	25
13–2690	Snake River at Weiser, Idaho	69,200	17,670	24,040	98	-38	15,400	9,950	28
13–3170	Salmon River at White Bird, Idaho ..	13,550	11,060	44,830	117	-12	28,800	18,600	28
13–3425	Clearwater River at Spalding, Idaho ..	9,570	15,320	41,530	113	-21	24,300	15,700	28
14–1057	Columbia River at The Dalles, Oreg.[5]	237,000	194,000	293,800	65	-19	....	....	.....
14–1910	Willamette River at Salem, Oreg	7,280	23,370	12,170	91	-39	10,280	6,640	26-30
15–5155	Tanana River at Nenana, Alaska	25,600	24,040	37,183	76	+54	34,500	22,300	30
8MF005	Fraser River at Hope, British Columbia.	78,300	95,300	257,000	104	+3	284,000	184,000	29

[1] Adjusted.
[2] Records furnished by Corps of Engineers.
[3] Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4] Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5] Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.
*The U.S. station numbers as listed in this table are in a shortened form previously in use, and used here for simplicity of tabular and map presentation. The full, correct number contains 8 digits and no punctuation marks. For example, the correct form for station number 1–3185 is 01318500.

(Continued from page 6.)

City, Eden, and Gooding, and fell in the Rupert-Minidoka area; monthend levels were below average in three of the four areas and were above average at Gooding.

ALASKA

Streamflow generally increased seasonally as a result of increased snowmelt in south-central Alaska. Monthly mean discharge was in the below-normal range at the index stations, Gold Creek at Juneau and Chena River at Fairbanks as a result of below-normal precipitation and winter snowfall that was less than normal.

Ground-water levels in the confined aquifer in the Anchorage area rose 1 to 2 feet in the lowlands. Levels in the unconfined aquifer declined about ½ foot as a result of below-normal precipitation.

METRIC EQUIVALENTS OF UNITS USED IN THE WATER RESOURCES REVIEW

(Round-number conversions, to nearest four significant figures)

1 foot = 0.3048 metre 1 mile = 1.609 kilometres
1 acre = 0.4047 hectare = 4,047 square metres
1 square mile (sq mi) = 259 hectares = 2.59 square kilometres (sq km)
1 acre-foot (ac-ft) = 1,233 cubic metres
1 million cubic feet (mcf) = 28,320 cubic metres
1 cubic foot per second (cfs) = 0.02832 cubic metres per second = 1.699 cubic metres per minute
1 second-foot-day (cfsd) = 2,447 cubic metres
1 million gallons (mg) = 3,785 cubic metres = 3.785 million litres
1 million gallons per day (mgd) = 694.4 gallons per minute (gpm) = 2.629 cubic metres per minute = 3,785 cubic metres per day

---

WATER RESOURCES REVIEW

JUNE 1976

Based on reports from the Canadian and U.S. field offices; completed July 8, 1976

TECHNICAL STAFF
J.C. Kammerer, Editor-in-Chief
C.W. Saboe, Associate Editor
Allen Sinnott
T.H. Woodard
R.M. Kosco

COPY PREPARATION
L.C. Fleshmon, Chief
D.L. Radcliffe
M.C. Olson
S. L. Peterson

EXPLANATION OF DATA

Cover map shows generalized pattern of streamflow for June based on 22 index stream-gaging stations in Canada and 130 index stations in the United States. Alaska and Hawaii inset maps show streamflow only at the index gaging stations which are located near the points shown by the arrows.

Streamflow for June 1976 is compared with flow for June in the 30-year reference period 1931–60 or 1941–70. Streamflow is considered to be *below the normal range* if it is within the range of the low flows that have occurred 25 percent of the time (below the lower quartile) during the reference period. Flow for June is considered to be *above the normal range* if it is within the range of the high flows that have occurred 25 percent of the time (above the upper quartile).

Flow higher than the lower quartile but lower than the upper quartile is described as being *within the normal range*. In the Water Resources Review the median is obtained by ranking the 30 flows of the reference period in their order of magnitude; the highest flow is number 1, the lowest flow is number 30, and the average of the 15th and 16th highest flows is the median.

The normal is an average (but not an arithmetic average) or middle value; half of the time you would expect the June flows to be below the median and half of the time to be above the median. Shorter reference periods are used for the Alaska index stations because of the limited records available.

Statements about *ground-water levels* refer to conditions near the end of June. Water level in each key observation well is compared with average level for the end of June determined from the entire past record for that well or from a 20-year reference period, 1951–70. *Changes in ground-water levels*, unless described otherwise, are from the end of May to the end of June.

The Water Resources Review is published monthly. Special-purpose and summary issues are also published. Issues of the Review are free on application to the Water Resources Review, U.S. Geological Survey, Reston, Virginia 22092.

SUMMARY APPRAISALS OF THE NATION'S GROUND-WATER RESOURCES--TEXAS-GULF REGION

The abstract, map, and graph below are from the report, *Summary appraisals of the Nation's ground-water resources--Texas-Gulf Region*, by E. T. Baker, Jr., and J. R. Wall: U.S. Geological Survey Professional Paper 813-F, 29 pages, 1976. This report, a summary of the distribution, availability, and quality of ground water and its importance in the regional water supply, may be purchased for $2.45 from Branch of Distribution, U.S. Geological Survey, 1200 S. Eads St., Arlington, VA 22202 (check or money order payable to U.S. Geological Survey); or from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402 (GPO Stock number 024-001-02734-8), payable to Superintendent of Documents.

ABSTRACT

Ground water in the Texas-Gulf Region (fig. 1) is a large and important resource that can provide a more significant percentage of the total water supply of the region. Total water requirements within the region are projected to rise sharply from 14 million acre-feet (17 cubic kilometres) in 1970 to nearly 26 million acre-feet (32 cubic kilometres) in 2020. About half of the water used in 1970 was ground water.

An estimated total of 1.04 billion acre-feet (1,280 cubic kilometres) of recoverable water containing less than 3,000 milligrams per litre dissolved solids is stored above a depth of 400 feet (122 metres) in the aquifers of the region. In addition, part of an estimated 3.28 billion acre-feet (4,040 cubic kilometres) of water in storage below 400 feet (122 metres) is recoverable. Although not all of the ground water in storage is recoverable, a significant amount is available for development; and an enormous quantity is accessible should occasions prompt its use on a time-limited basis.

The total steady-state yield (amount of water that approximates the maximum perennial replenishment from precipitation) of the region's aquifers is about 4.6 million acre-feet (5.7 cubic kilometres) annually, or about 2.3 times the ground-water usage in 1970 if the large mining draft on the High Plains is not considered as part of the total steady-state yield. Because of the large quantity of recoverable ground water in storage, the steady-state yield can be augmented for a very long time on a "deferred" basis, whereby the economic use of the water that is withdrawn from storage in excess of the steady-state yield may result in a strengthened economy.

An important goal in programs for meeting future water needs should be to identify the full potential of the available ground-water resources. The subsurface reservoirs may be utilized not only as sources of fresh and treatable water, but as storage facilities for other freshwater supplies and as possible sources of geothermal energy. Some saline-water reservoirs may be suitable for liquid-waste storage or disposal.

Large-scale and unregulated ground-water pumping may result in hydrologic problems such as declining water levels (fig. 2), streamflow depletion, and land-surface subsidence; but studies on proper development of the ground-water reservoirs could provide solutions to many of the problems. Water rights and other legal concepts should be based on sound hydrologic principles to assist development of water resources in an orderly and efficient manner.

Because significant amounts of ground water are available, the opportunities for expanding and conjunctive use of ground water and surface water should be considered in regional plans for water development and conservation. The complexities of water management and the difficulties of achieving an integrated system of total-water management will require additional technical information.

Figure 1.--Index map showing location of the Texas-Gulf Region.

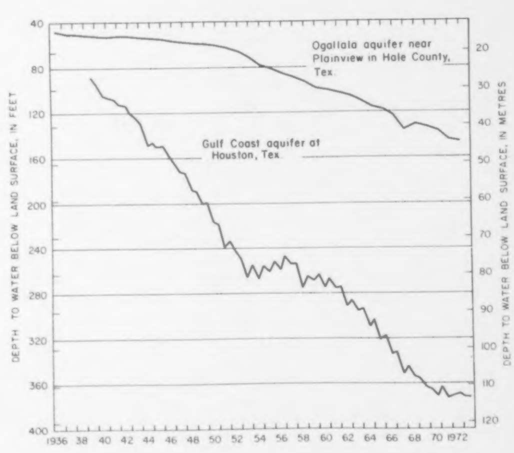


Figure 2.--Hydrographs showing water-level declines in the Ogallala aquifer near Plainview, Texas, and in the Gulf Coast aquifer at Houston, Texas.